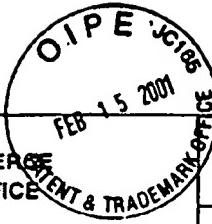


EXHIBIT 1

FORM PTO-1449
Inventor "Lars Friedrich"
Filing date 08/31/2000.

Form PTO-1449 (Modified)



FORM PTO-1449 U.S. DEPARTMENT OF COMMERCE
(Modified) PATENT AND TRADEMARK OFFICE

**INFORMATION DISCLOSURE
STATEMENT BY APPLICANT**

(Use several sheets if necessary)

(37 CFR 1.98(b))

U.S. PATENT DOCUMENTS

EXAMINER INITIAL	PATENT NUMBER							ISSUE DATE	PATENTEE	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
	6	0	8	8	1	5	2					
AB	5	0	3	9	1	9	9	08/13/91	Mollenauer, et al.	359	334	
AB	5	4	0	6	4	0	4	04/11/95	DiGiovanni, et al.	359	161	
AB	6	0	5	2	2	1	9	04/18/00	Kidorf, et al.	359	334	
AB	5	8	8	3	7	3	6	03/16/99	Oshima, et al.	359	341	
AB	6	0	4	0	9	3	3	03/21/00	Khaleghi, et al.	359	124	
AB	5	2	2	5	9	2	2	07/06/93	Chraplyvy, et al.	359	124	
AB	5	9	5	9	7	5	0	09/28/99	Eskildsen, et al.	359	134	
AB	5	8	4	7	8	6	2	12/08/98	Chraplyvy, et al.	359	164	
AB	6	0	3	8	3	5	6	03/14/00	Kerfoot, III, et al.	385	24	
AB	6	1	1	5	1	7	4	09/05/00	Grubb, et al.	359	334	

FILING DATE: 08/31/00 GROUP: Unassigned
RECEIVED 8/31/00

~~FEB 21 2001~~ LIVED 2033
Technology

FOREIGN PATENT OR PUBLISHED FOREIGN PATENT APPLICATION

OTHER DOCUMENTS (Including Author, Title, Date, Relevant Pages, Place of Publication***)**

A. M. Hill, et al., "Nonlinear Crosstalk Due to Stimulated Raman Scattering in a Two-Channel Wavelength-Division-Multiplexed System", Electronics Letters, Vol. 20, No. 6, 1984

EXAMINER

DATE CONSIDERED

9/16/03

EXAMINER: Initial citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

EXHIBIT 2

U.S. Patent No. 6,466,362 B1
Serial No. 09/651,840
Inventor "Lars Friedrich"
Filing date 08/31/2000



US006466362B1

(12) United States Patent
Friedrich(10) Patent No.: US 6,466,362 B1
(45) Date of Patent: Oct. 15, 2002

(54) HYBRID AMPLIFIER AND CONTROL
METHOD HEREOF THAT MINIMIZES A
NOISE FIGURE FOR PARTICULAR SPAN
LOSS

(75) Inventor: Lars Friedrich, Glen Burnie, MD (US)

(73) Assignee: Clea Corporation, Linthicum, MD
(US)

(*) Notice: Subject to any disclaimer, the term of this
patent is extended or adjusted under 35
U.S.C. 154(b) by 0 days.

(21) Appl. No.: 09/651,840

(22) Filed: Aug. 31, 2000

(51) Int. Cl. 7 H01S 3/30

(52) U.S. Cl. 359/334; 359/341.1; 359/337

(58) Field of Search 359/341.41, 341.42,
359/334, 337, 337.4

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Primary Examiner—Thomas H. Tarcza

Assistant Examiner—Stephen Cunningham

(74) Attorney, Agent, or Firm—Michael R. Cammarata

(57) ABSTRACT

A hybrid amplifier reduces the noise generated by the hybrid amplifier. The hybrid amplifier includes a rare-earth doped fiber amplifier such as an EDFA (erbium-doped fiber amp), a Raman amplifier, a controller and a memory device. Noise is reduced by determining a gain balance between the EDFA and Raman amp that minimizes the noise figure. The controller performs a method that generates a plurality of functions relating the hybrid amp noise figure and the Raman gain for a particular span loss. These functions are then utilized to determine the Raman gain portion of the gain balance that minimizes the noise figure. The remaining portion of the gain balance is made up by the EDFA. For a hybrid amplifier that will see only one span loss value, then only one such function needs to be generated. Furthermore, the memory device of the hybrid amplifier can be programmed to store an optimum control curve that minimizes the noise figure for one or a plurality of span losses.

13 Claims, 8 Drawing Sheets

